

3D Accu<sup>i</sup>tomo 170



Thinking ahead.



Focused on life.



**THE NEW WORLD OF THE 80  $\mu\text{m}$  VOXEL**

## **SUPER RESOLUTION: 80 $\mu$ m VOXEL**

**Low Patient Effective Dose**

**High Quality Images with  
Low X-Ray Radiation**

### **Four Imaging Modes**

A mode to serve every purpose. High Resolution Mode and High Fidelity Mode can be used for even higher quality images. High Speed Mode reduces motion artifacts. Standard Mode is ideally suited to all fields of view.

### **Nine Sizes for Field of View (FOV)**

Choose from nine sizes for the FOV with diameters ranging from 170 mm to 40 mm to minimize X-ray dosage.

### **Five Resolution Levels**

Morita offers the best FOV solution for the respective FOV, which is the most suitable for your diagnostic requirements: 80  $\mu$ m, 125  $\mu$ m, 160  $\mu$ m, 200  $\mu$ m or 250  $\mu$ m.

### **Zoom Reconstruction**

Use the original exposure data to zoom in on critical areas using voxel sizes as small as 80  $\mu$ m.

### **Compact**

Space-saving dimensions:

W 1,620 mm x D 1,250 mm (63-3/4" x 49-1/4")

Recommended minimum room size:

W 2,000 mm x D 1,800 mm (6-3/4' x 6')

### **DICOM Compatible**

### **Viewing Software**

With the Viewer Software of Morita, you can view and manipulate the 3D image data even on a computer that does not have i-Dixel software.



## 80 $\mu\text{m}$ SUPER HIGH RESOLUTION

**SELECT A REGION OF INTEREST SUCH AS THE TEMPORAL BONE, PARANASAL SINUS, JAWBONE OR INDIVIDUAL TEETH AND OBSERVE IT WITH 80  $\mu\text{m}$  VOXEL RESOLUTION FOR GREATER DETAIL.**

### Five Resolution Levels

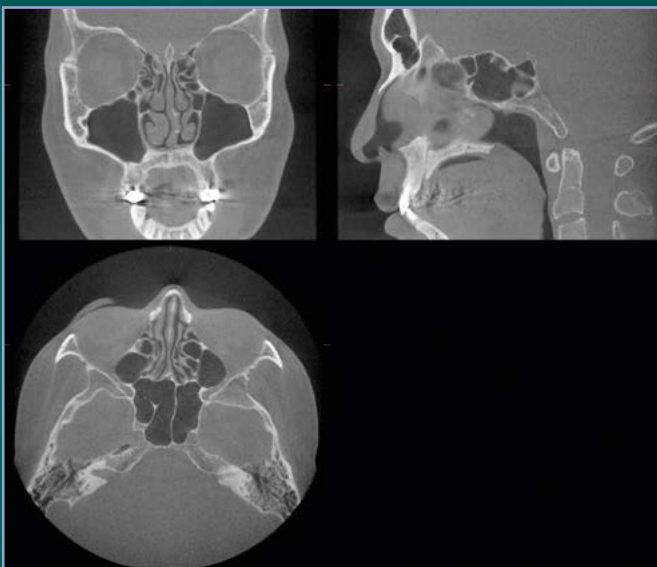
Select voxel size, 80  $\mu\text{m}$ , 125  $\mu\text{m}$ , 160  $\mu\text{m}$ , 200  $\mu\text{m}$ , or 250  $\mu\text{m}$ , that best suits your diagnostic needs.\*

### Zoom Reconstruction

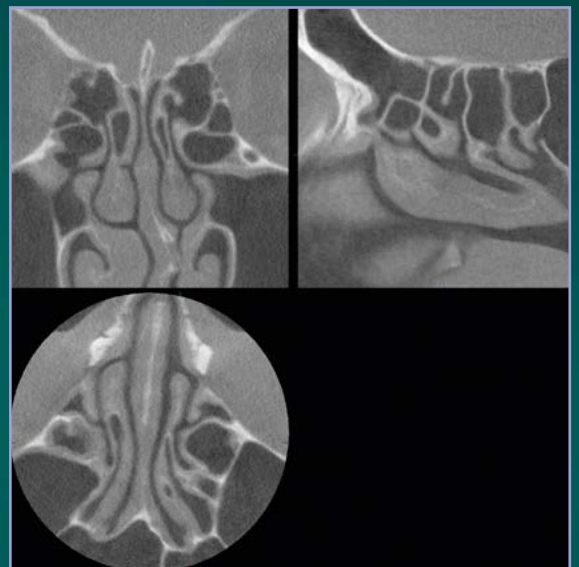
Use the original exposure data to zoom in on critical areas using a voxel size as small as 80  $\mu\text{m}$ .

For a higher resolution image, a specified area can be recalculated and reconstructed using a smaller voxel size.

*\*Depending on the size of the Field of View, some voxel sizes may not be possible.*



$\phi$  170 x H 120 mm, Voxel size: 250  $\mu\text{m}$



$\phi$  50 x H 150 mm, Voxel size: 80  $\mu\text{m}$

## FOUR IMAGING MODES

### HIGH RESOLUTION MODE AND HIGH FIDELITY MODE CAN BE USED

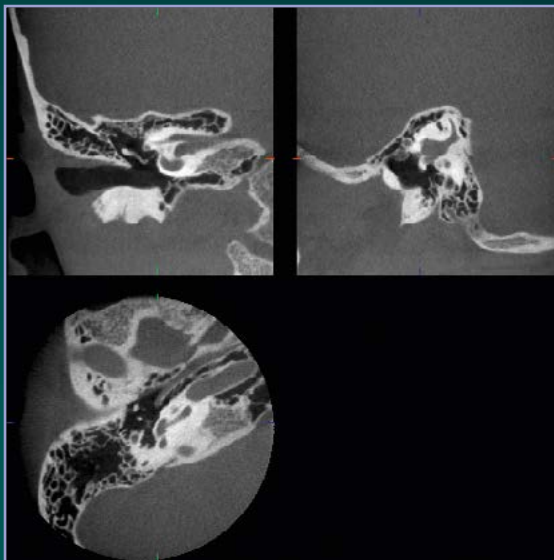
for even higher quality images. High Speed Mode reduces motion artifacts. Standard Mode is ideally suited to all fields of view.

#### High Resolution Mode (Hi-Res)

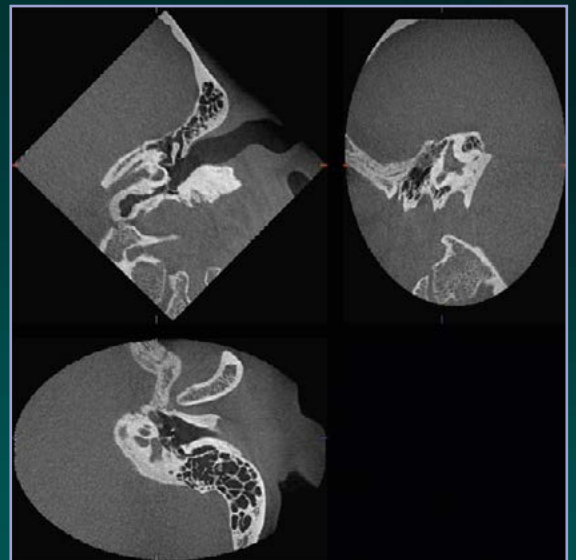
This is the highest resolution. Exposures are made at one-fourth the size of the detector pixels for the greatest spatial resolution. Ideal for observation of delicate bone structures such as the ossicular chain.

#### High Fidelity Mode (Hi-Fi)

This mode has high data density data to make clearer and sharper images. This is especially good for performing zoom reconstructions.



Standard Mode:  $\phi$  60 mm



High Resolution Mode:  $\phi$  60 mm



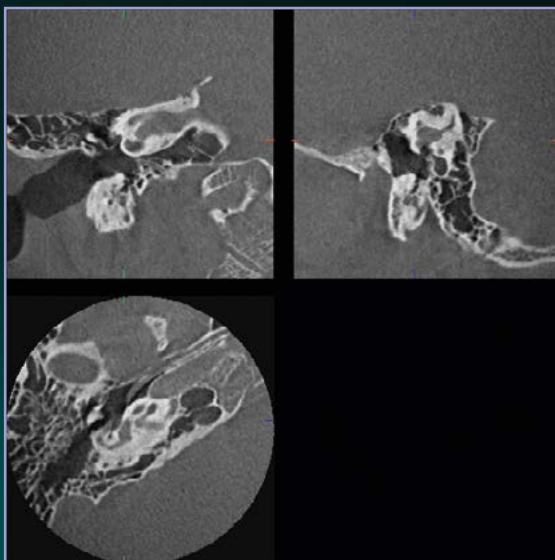
**High Speed Mode (Hi-Speed)**

Full scan: 10.5 sec. Half scan: 5.4 sec.

The High Speed Mode reduces motion artifacts. Good for children or others with difficulty remaining motionless.

**Standard Mode (Std)**

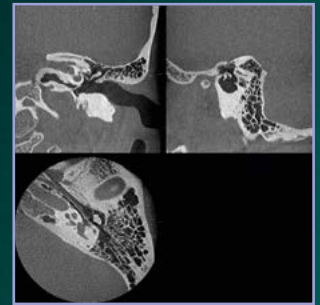
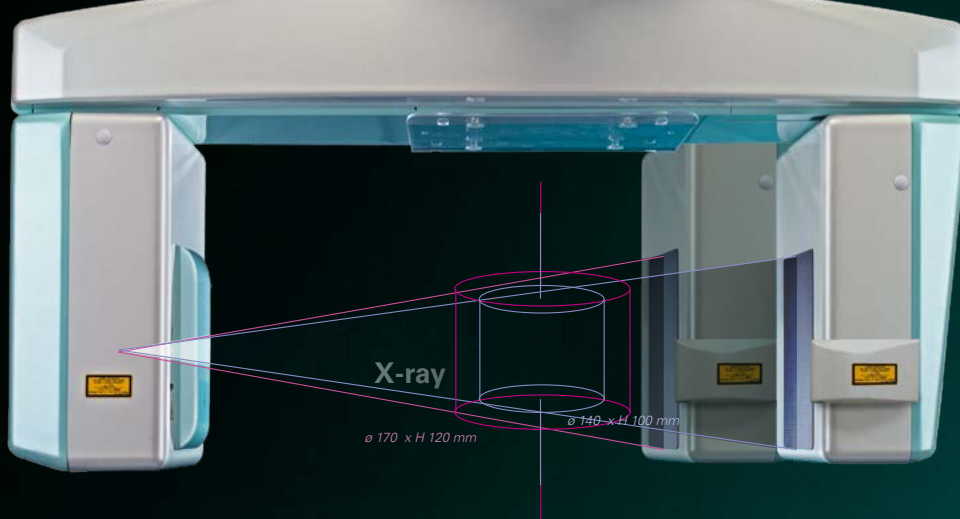
Suitable for all views and images of temporal bone, paranasal sinus, maxilla and mandible, individual teeth etc.



High Fidelity Mode:  $\phi$  60 mm Zoom reconstruction



High Fidelity Mode:  $\phi$  170 x H 120 mm



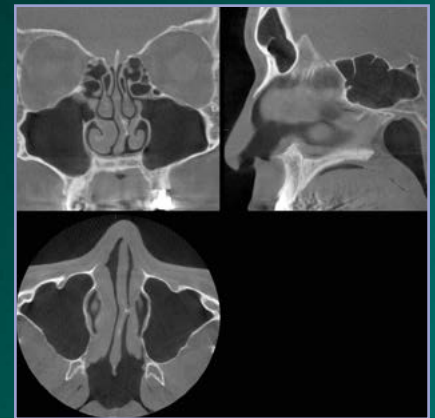
Temporal bone: ø 60 x H 60 mm

## FLAT PANEL DETECTOR (FPD) POSITION ADJUSTMENT

Adjusting the position of the FPD reduces X-ray dosage, provides higher resolution, and minimizes distortion.

For regions such as ø 140 x 100 mm, moving the FPD slight farther away from the center of the exposure area results in a more nearly orthographic projection, which reduces distortion and improves resolution.

Optimizing collimation of the beam depending on the size of the area also reduces X-ray dosage and X-ray scattering as well.



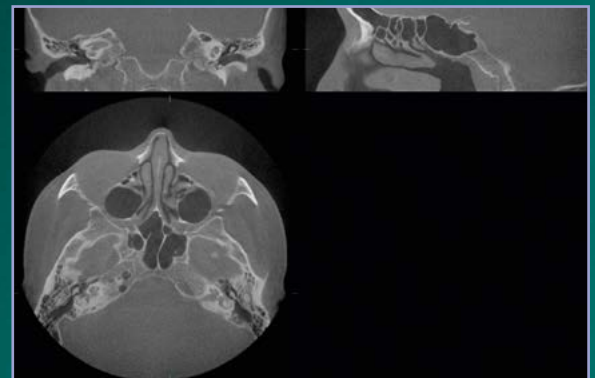
Paranasal sinuses: ø 100 x H 100 mm

## NINE EXPOSURE REGION SIZES

There are nine sizes for exposure regions with diameters ranging from 170 to 40 mm.

Diameter x Height (mm)

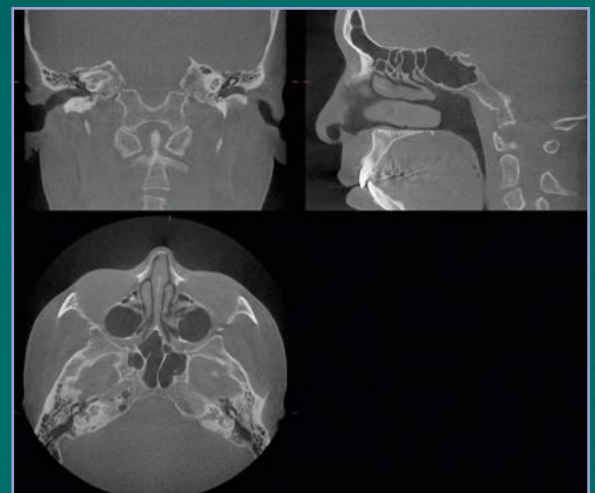
- ø 170 x 120 mm    ø 170 x 50 mm
- ø 140 x 100 mm    ø 140 x 50 mm
- ø 100 x 100 mm    ø 100 x 50 mm
- ø 80 x 80 mm
- ø 60 x 60 mm
- ø 40 x 40 mm



Observation of the paranasal sinuses together with right and left temporal bone: ø 170 x H 50 mm

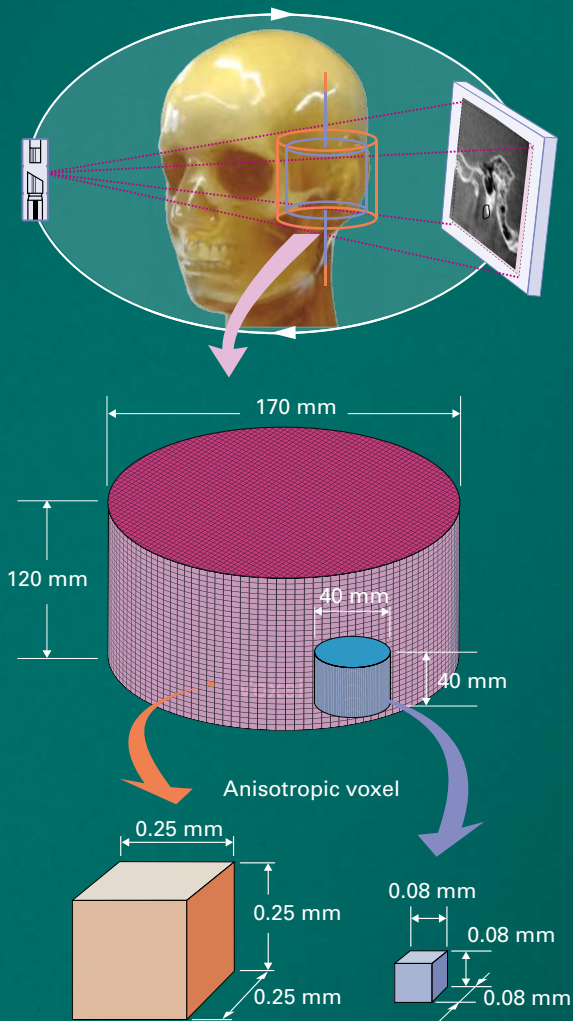
## RESOLUTION STAYS HIGH FOR EVEN LARGE AREAS

Resolution stays high and distortion is minimized for all regions from the smallest (ø 40 x 40 mm) to the largest (ø 170 x 120 mm).



Observation of the paranasal sinuses together with right and left temporal bone: ø 170 x H 120 mm

# CONE BEAM CT RADIOGRAPHY

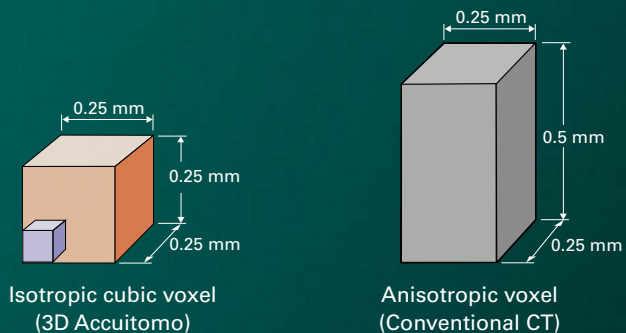


## Principle

The arm rotates 360° around the center of the exposure region in 17.5 seconds (Standard Mode) as the X-ray head emits a cone-shaped beam. The multiple projections created during the arm's rotation are converted to a digital signal by the flat panel detector and transmitted to the computer. After any necessary supplemental or corrective processing, the digital information is converted into a three dimensional CT image using an image reconstruction algorithm, and a high resolution image appears on the computer's display.

## Low X-ray Dosage

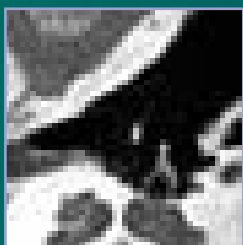
Compared to the CTDI<sub>w</sub> value for exposures of the head and neck region, the X-ray dosage for a standard 17.5-second exposure is less than one-seventh\* of that for a conventional CT scan. (This is based on Morita's actual measurements.)



## Features of the Isotropic Cubic Voxel

The voxel of 3D Accutomo is an isotropic cube that produces images with equally fine detail in all three dimensions and minimizes artifacts produced by slice pitch and helical pitch; therefore resolution is never degraded by re-slicing. Conversely the rectangular voxel used for conventional CT imaging results in some image degradation when it is re-sliced.

Voxel: The minimum unit of 3D data.



Voxel size: 250  $\mu\text{m}$



Voxel size: 80  $\mu\text{m}$

Enlarged yet smooth and distortion-free 80  $\mu\text{m}$  high resolution images

\* Comparison of the CTDI<sub>w</sub> value based on IEC60601-2-44 under Morita's recommended exposure conditions and the CTDI<sub>w</sub> diagnostic reference level for the face and paranasal sinusal regions according to ICRP Pub. 87, appendix A.

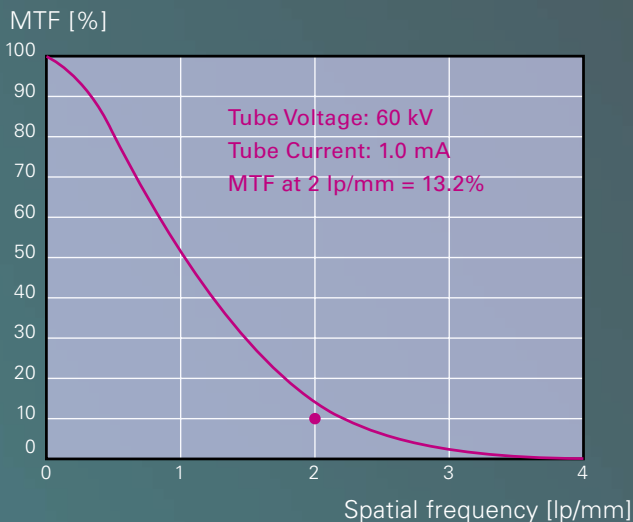
## HIGH QUALITY 3D IMAGES WITH LOW X-RAY RADIATION

### USING A HIGH-SENSITIVITY, HIGH-RESOLUTION FLAT PANEL DETECTOR,

high quality and extremely detailed images of the many regions of the head and neck such as the temporal bone, paranasal sinuses, eye sockets, mandible, and cranial base can be obtained for a wide range of multi-purpose diagnostic scanning.



### Spatial Resolution\* MTF: Modulation Transfer Function



*This function is based on data from a typical product.*

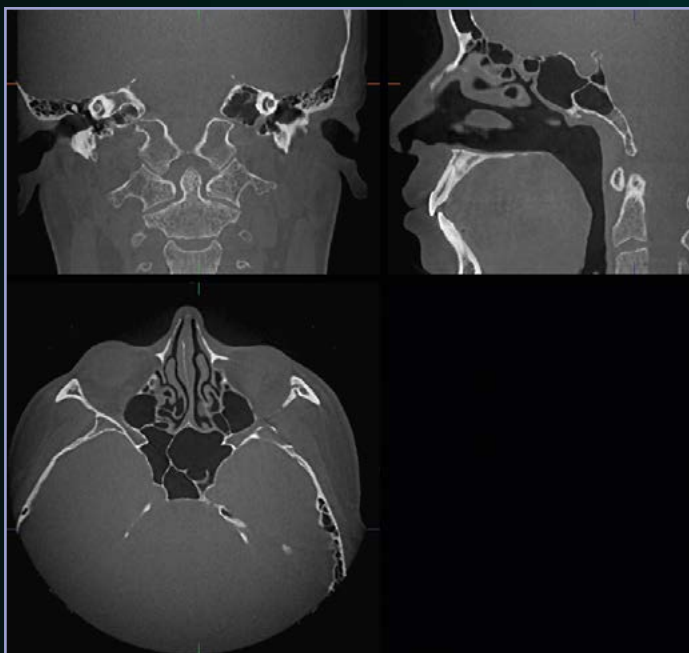
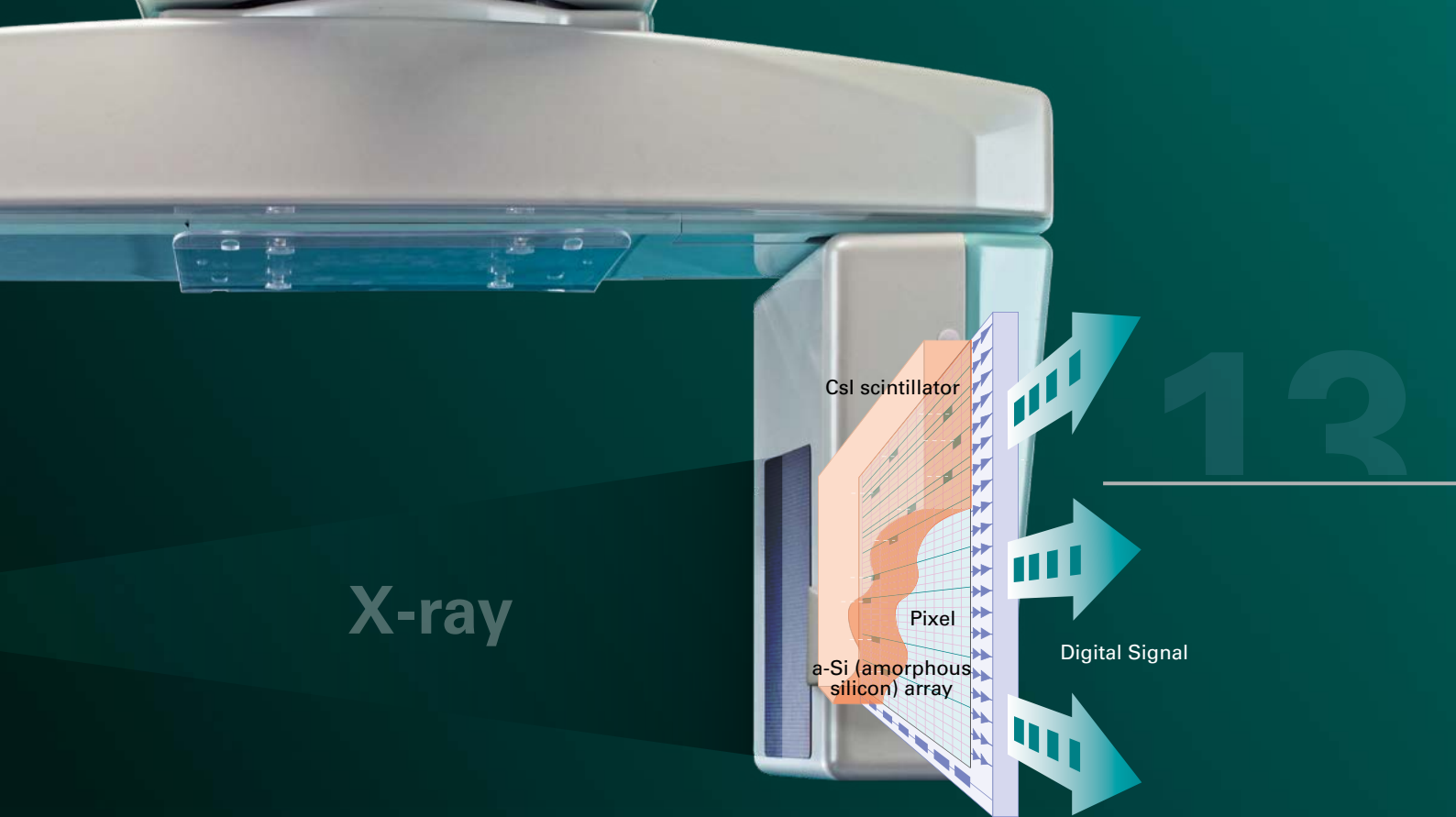
### Flat Panel Detector (FPD)

FPD conversion of X-ray exposure into a digital signal results in a dramatic improvement in image quality and a reduction in X-ray dosage. The FPD is not affected by magnetic fields and has superb sensitivity and resolution to produce superior 3D images with a minimum of distortion and a wide dynamic range expressed with a rich distribution of the gray scale.

**X-rays** are converted into visible light by the directly deposited CsI scintillator and then the light is converted into an electrical signal by a photo diode. The FPD is quite thin and has a long working life.

### High Resolution

Detailed images have a resolution of at least 2.0 lp/mm (MTF 10%) with a voxel size of 80  $\mu\text{m}$ .



Highly detailed imaging

### Minimal Distortion

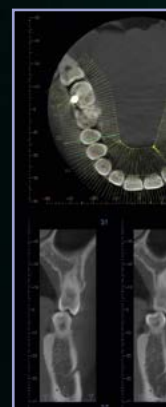
The flatness of the detector minimizes distortion. This eliminates the necessity of making corrections for distortion before reconstructing images as is the case for analog systems.

### Wide Dynamic Range\*\*

The Flat Panel Detector (FPD) has a wide dynamic range of 14 bit data (64 times 8 bit data). This produces a richer and truer gray scale.

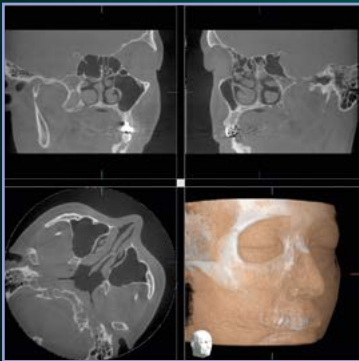
\* Spatial resolution refers to how distinct an image appears the smaller it becomes; it measures the fineness of an image. Spatial frequency is the unit of measurement of line pairs per distance (mm). As the map scale decreases, the patterns of contrast become harder to see. This is known as MTF (Modulation Transfer Function). It represents the number of line pairs per 1 mm that can be distinguished based on contrast. It is said that humans can only differentiate about 10%.

\*\* Dynamic range: Numerical values express the reproducibility of the signal and the ratio of the largest and smallest input values in dBs. The dynamic range of the digital signal is also sometimes expressed in bits. The highest signal level is taken to be the level remaining after subtracting the noise level. The value of the dynamic range indicates how weak of a signal can be reproduced – or, in other words, how high the contrast resolution will actually turn out to be.



## i-Dixel DIAGNOSTIC SOFTWARE

**i-Dixel DIAGNOSTIC SOFTWARE** can be used as a database to archive a wide variety of image information. Its multiple image processing functions can easily access and manipulate many types of information for 2D and 3D images.



### Volume Rendering

Volume rendering of CT data produces three dimensional images. Select the area of interest and adjust the controls for the histogram to create a detailed image of very fine structures.

### Real Time Re-Slice

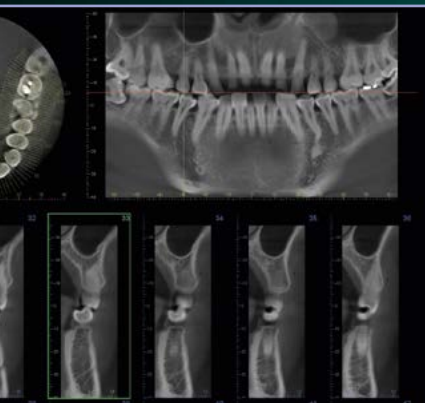
Slices and volume rendered images can be linked and easily manipulated in real time.

### Curved MPR (cMPR)

This way of image processing allows you to observe an orthogonal representation of the dental arch or any arbitrary curve.

### Report Comments

It is easy to enter comments for any image. These comments can be printed with a conventional Windows printer or a DICOM printer.



### Other Key Features

- XYZ view windows
- Re-slice
- Zoom
- Rotate
- Histogram
- Edge enhancement
- Distance and Angle Measurement
- Negative image
- Mirror image
- Slice Distance Measurement
- Surface Rendering
- DICOM 3.0 compatible
- Brightness Conversation
- Spatial Frequency Filter
- Patient Orientation Display
- Density Measurement
- Implant Database
- Nerve Canal Marking
- 3D Zoom Box
- VDDS



3D Accutomo 170



i-Dixel software



i-Dixel software



i-Dixel software

### Intra-clinic network

### Out of network computer

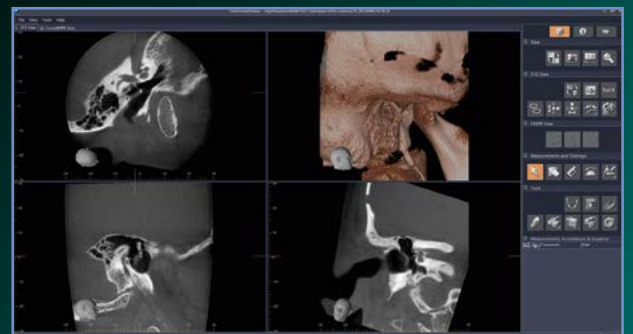
In external clinic networks without 3D Accutomo 170, 3D-CT images can be viewed on a PC with both of the following methods:



i-Dixel Viewer Software



One Data Viewer  
Ona Volume Viewer



One Volume Viewer



## SHARING IMAGE DATA

### INSTALLING i-Dixel SOFTWARE

on all intra-clinic computers enables sharing of image data on each linked client computer. Observation of images on non-network computers can be achieved with the One Data Viewer, and the One Volume Viewer without installing i-Dixel.

#### One Data Viewer & One Volume Viewer Software

These unique Morita applications let you view three dimensional images and volume rendered images even if the computer does not have i-Dixel software installed.

CT data can be exported from the i-Dixel application and later stored on a DVD. This DVD can then be used on a computer outside the clinic to view CT images, volume rendered images and patient information.

Additional functions include zoom, black and white reverse, brightness, and contrast adjustment as well as optional length and angle measurement capabilities.

#### i-Dixel conforms to the following DICOM standards:

1. Modality worklist management service class (optional)
2. Storage service class
3. Modality performed procedure step service class
4. Print management service class



# 3D AccuTomo

XYZ Slice View Tomograph

READY SCAN time 1.0 sec

MODE	
CT	SCOUT

FOV	
Φ170 × 120	
X	0.0mm
Y	+ 20.0mm
Z	+ 122mm

SCAN	
180°	360°

SCAN MODE			
Std	Hi-Fi	Hi-Res	Hi-Speed

80 kV 2.0 mA

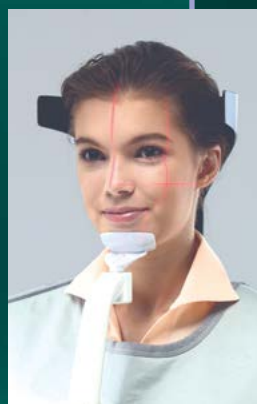
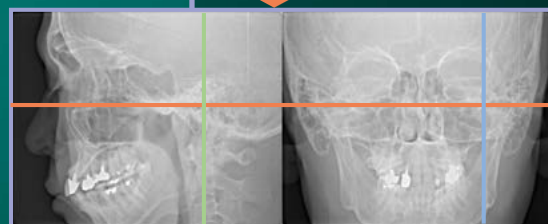
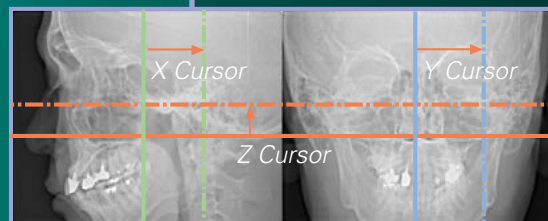
Tube Voltage	Tube Current	Param. Memory

J. MORITA MFG. CORP.  
Kyoto Japan



IN/OUT READY BEAM

LOCK/FREE



## SIMPLE, ACCURATE POSITIONING

**THE SCOUT POSITIONING SYSTEM IS EASY AND ACCURATE. USE THE TRIPLE BEAM POSITIONING SYSTEM FOR EVEN GREATER PRECISION.**

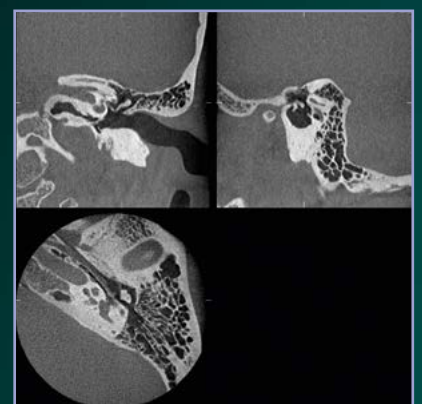
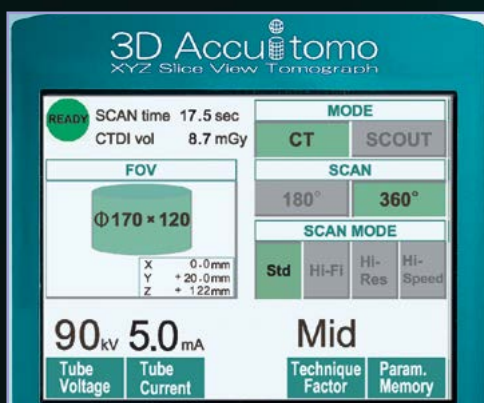
### Two-Direction Scout

The region of interest can be easily targeted by making images from two directions. Then you can simply click on the images to specify the center of the region of interest. This information is transmitted to the X-ray unit, and the chair automatically moves into position.

### Easy High Precision

The region of interest can be easily targeted using the three positioning laser beams. The patient's head is safely and securely stabilized by the chin rest and head rest.

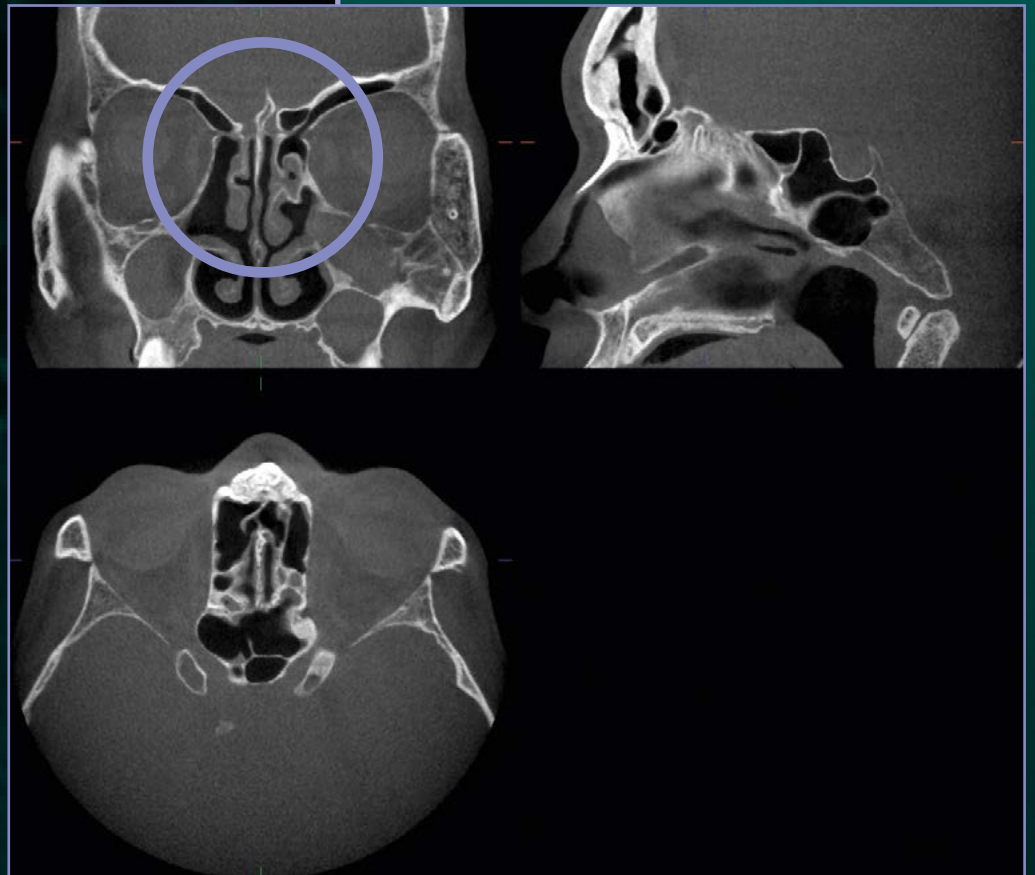
*\* The Scout exposure (80 kV and 2.0 mA) will increase the total X-ray dosage of a Standard Mode CT exposure (90 kV and 5.0 mA) by about 2%.*



3D-CT image  
Region of interest is  
well centered.



Temporal Bone:  $\phi$  60 x H 60 mm, Voxel size: 125  $\mu$ m



Paranasal sinuses:  $\phi$  170 x H 120 mm, Voxel size: 250  $\mu$ m

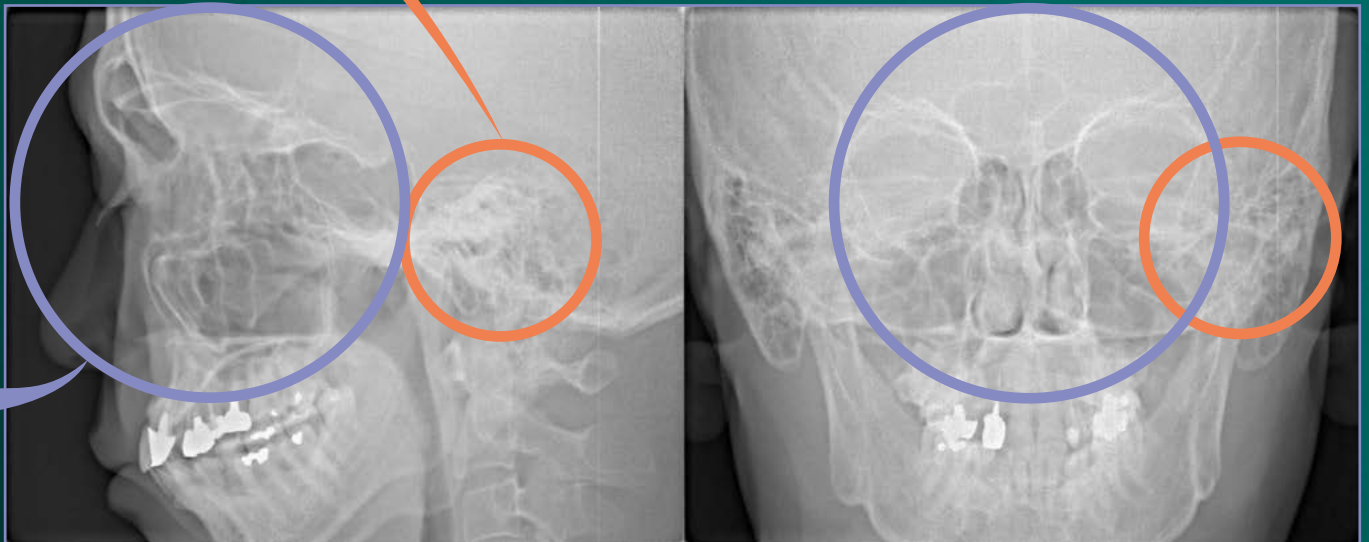
## LIMITED CT IMAGE AREA FOR REDUCED X-RAY DOSAGE

### LIMIT THE X-RAY DOSAGE

Use scout to accurately determine the minimal region of interest before exposing the patient to the higher dosage CT scan.

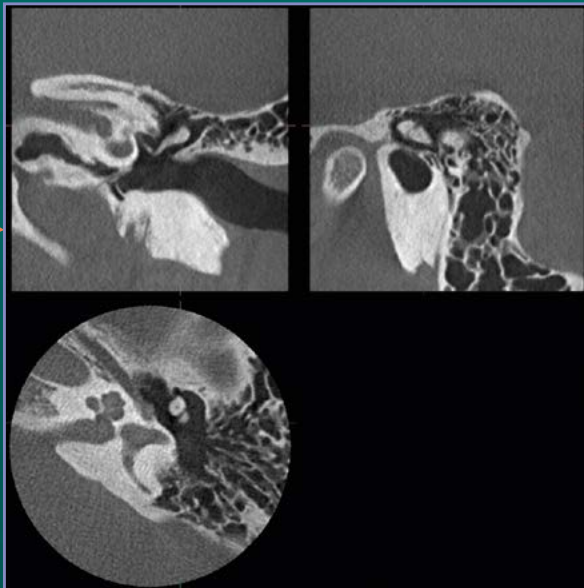
### IMAGING AREA: Diameter x Height (mm)

ø 170 x 120 mm	ø 170 x 50 mm
ø 140 x 100 mm	ø 140 x 50 mm
ø 100 x 100 mm	ø 100 x 50 mm
ø 80 x 80 mm	
ø 60 x 60 mm	
ø 40 x 40 mm	



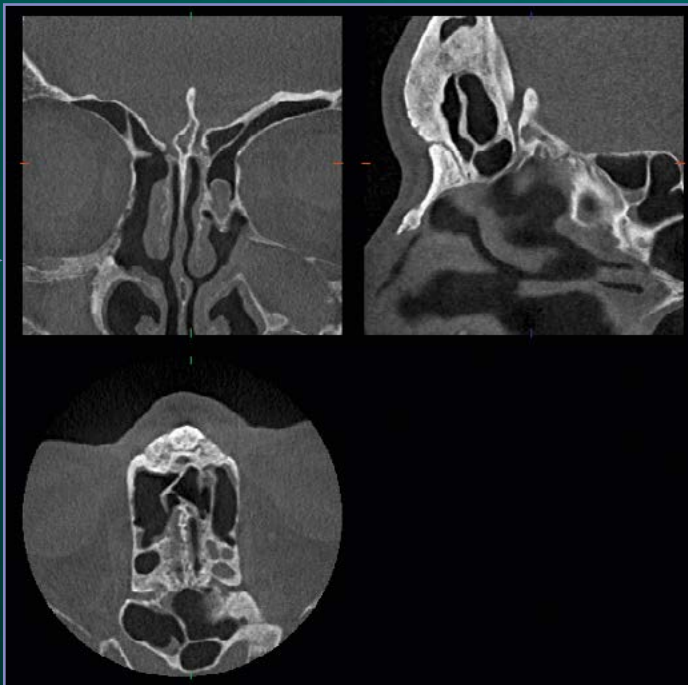
Scout Image

## ZOOM RECONSTRUCTION WITH 80 $\mu\text{m}$ VOXEL RESOLUTION

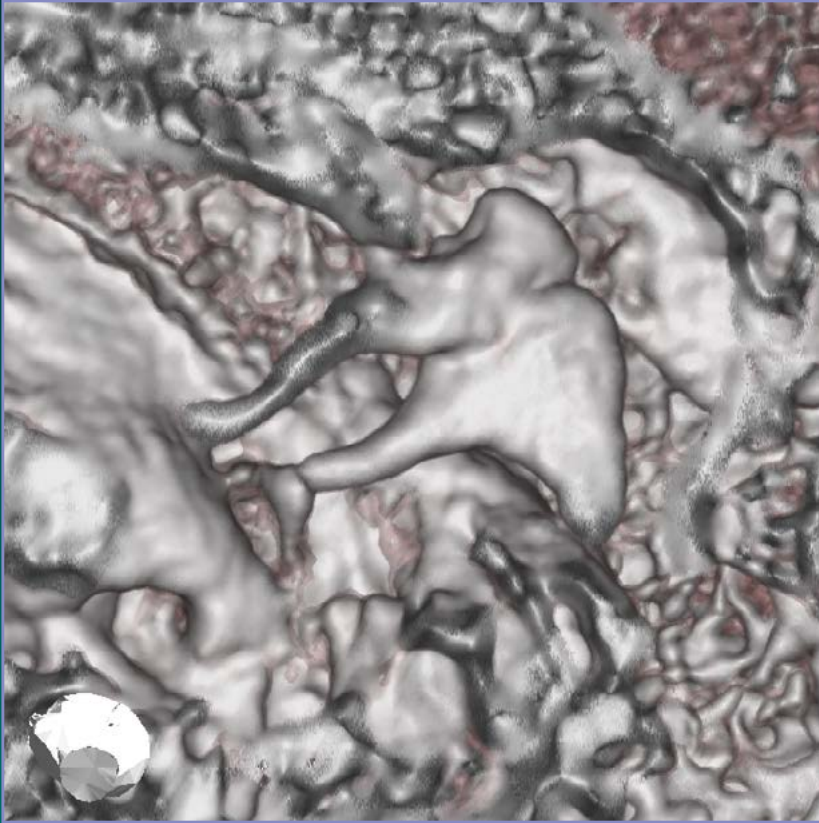


*Auditory ossicular chain zoom reconstruction*

Select a **region of interest** such as the temporal bone or paranasal sinus and zoom in with 80  $\mu\text{m}$  voxel resolution for a more detailed observation.

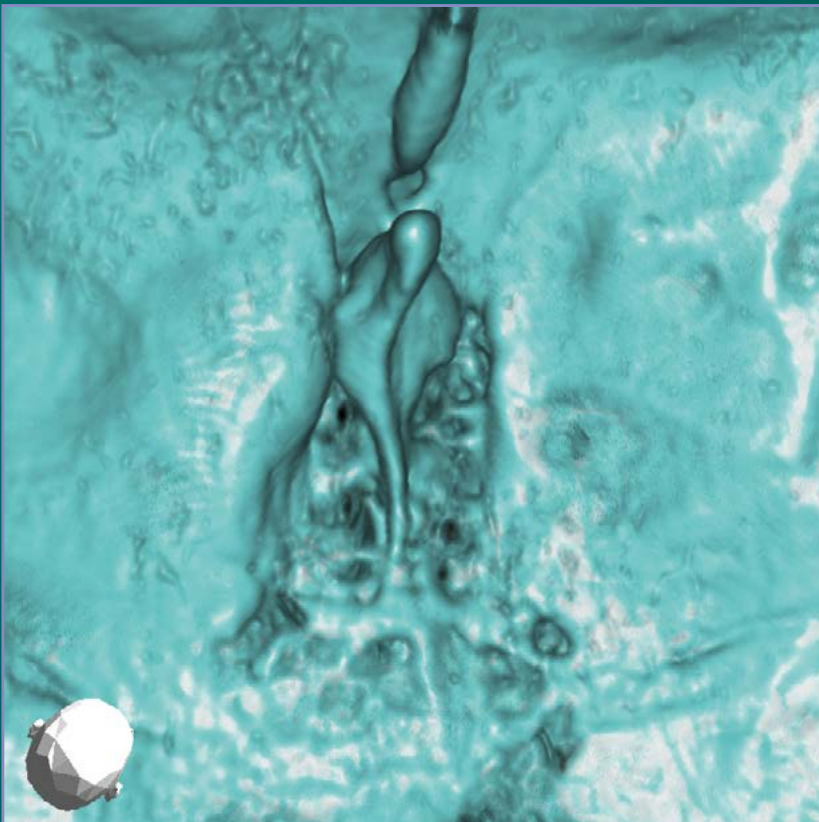


*Ethmoid sinus zoom reconstruction*



*Auditory ossicular chain*

Volume rendering produces a detailed 3D view of internal structures.



*Lamina Cribrosa*

## HIGH RESOLUTION EVEN FOR WIDE AREAS

### HIGH RESOLUTION IMAGES

with a size of 170 mm (diameter) x 120 mm (height) enables comprehensive examination and visualization of the entire facial and maxillofacial and mandibular regions.

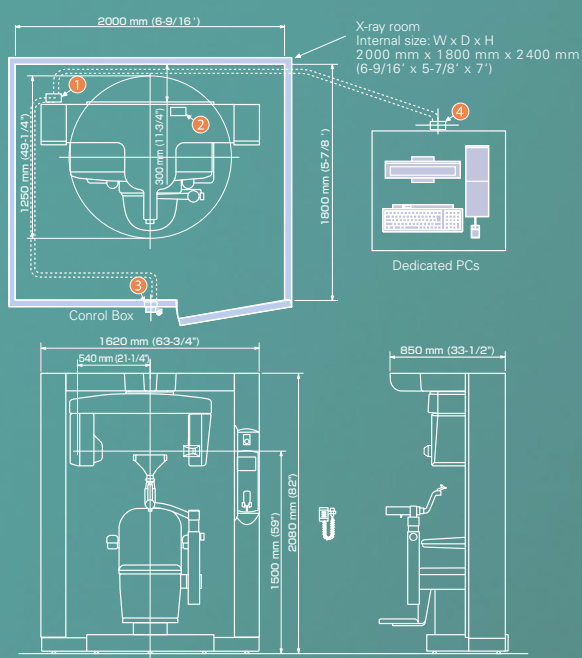


ø 170 x H 120 mm, Voxel size: 250 µm (90 kV, 6 mA)



# TECHNICAL SPECIFICATIONS

## Dimensions



- 1 Outlet of computer cable and operation cable
- 2 Outlet of power supply
- 3 Outlet of operation cable
- 4 Outlet of computer cable

Images provided by Fukushima Medical University  
 Technical Assistance: NUBIC (Nihon University Business, Research, and Intellectual Property Center)  
 Collaborative Development: J. Morita Corp. & Nihon University

## Specifications

Trade Name	3D Accuitomo XYZ Slice Viewer Tomograph	
Model	MCT-1	
Type	EX1/2 F17	
Input Voltage	100/110/120VAC 220/230/240VAC	
Power Consumption	max. 2.0 kVA	
X-ray Head		
Tube Voltage	60 - 90 kV	
Tube Current	1 - 10 mA (max 8 mA: Hi-Fi, Hi-Res Modes)	
Focal Spot Size	0.5 mm	
Exposure Time (360° / 180°)	Std Mode: 17.5/9.0 sec.	
	Hi-Fi Mode: 30.8/15.8 sec.	
	Hi-Res Mode: 30.8/15.8 sec.	
	Hi-Speed Mode: 10.5/5.4 sec.	
Field of View (Diameter x Height)	ø 170 x 120 mm	ø 170 x 50 mm
	ø 140 x 100 mm	ø 140 x 50 mm
	ø 100 x 100 mm	ø 100 x 50 mm
	ø 80 x 80 mm	
	ø 60 x 60 mm	
	ø 40 x 40 mm	
Voxel Size	80 µm, 125 µm, 160 µm, 200 µm, 250 µm	
Outer Dimensions		
Main Unit (W x D x H)	1,620 mm x 1,250 mm x 2,080 mm (63-3/4" x 49-1/4" x 82")	
Control Box (B x T x H)	96 mm x 40 mm x 115 mm (3-3/4" x 1-5/8" x 4-1/2")	
Weight	Approx. 400 kg (882 lbs)	

\* X-ray protection should be provided for the patient when X-rays are emitted.  
 \* Design and specifications are subject to change without notification.

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**J.MORITA MFG.CORP.**